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Mars land rovers powered by AFRL batteries

by Sarah Hubbard, Propulsion Directorate

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — When the Mars exploration rovers Spirit and Opportunity launched successfully from Cape Canaveral June 10 and July 7, a part of the Air Force Research Laboratory soared with them.

The two land rovers, expected to touch down and explore opposite sides of Mars in early 2004, are powered by rechargeable lithium-ion batteries AFRL's Propulsion Directorate experts researched and developed. Spirit and Opportunity will act as robot geologists while on the surface of Mars.

To search for and characterize a wide range of rocks and soils that hold clues to past water activity on Mars, NASA needed a more powerful lightweight battery to withstand extreme temperatures and provide more electricity to the rover.

Propulsion directorate officials said more power will allow them to perform on-site scientific investigations during the course of their 90-day mission and trek up to 40 meters a day.

Steve Vukson, a directorate chemical engineer, said researchers in the directorate's power division were already working on a new type of battery that exceeded commercial battery performance and fit NASA's needs. The result was a joint lithium-ion battery program expert in NASA's Glenn Research Center, the jet propulsion laboratory and the Propulsion Directorate established.

"The program wouldn't have been as successful without the cooperation of NASA Glenn/JPL," Vukson said. "We developed the technology, but the battery was designed by JPL and Lithion, a division of Yardney Technical Products."

JPL, a division of the California Institute of Technology in Pasadena, Calif., manages the Mars Exploration Rover project for NASA.

Continued collaboration between NASA, the Army and the Air Force is resulting in further battery technology being developed for widespread space and military applications, according to Vukson. The battery is lightweight, rechargeable and much more powerful than its predecessors.

The rover needs about 100 watts (equivalent to a standard light bulb in a home) to drive, NASA officials explained. Comparatively, the Sojourner rover's solar arrays provided the 1997 Pathfinder mission with around 16 watts of power at noon on Mars.

Equivalent to the power used by an oven light, this extra power will potentially enable the rovers to conduct more science.

To get the most out of their new technology, the two rechargeable batteries are stored in a warm electronics box that houses the rover's power system, Vukson explained.

NASA officials said the designated site for Spirit's mission is Gusev Crater. Opportunity will go to a site called Meridiani Planum. @